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(54) **METHOD AND SYSTEM FOR
CONFIGURING WIRELESS SENSORS IN AN
HVAC SYSTEM**

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(75) Inventors: **Stan Zywicki**, Eden Prairie, MN (US);
Cary Leen, Hammond, WI (US);
Barbara Dean-Henricks, Woodbury,
MN (US); **Steve C. Nichols**, Maple
Grove, MN (US); **Jeffrey Holmquist**,
Minneapolis, MN (US); **Jan Tesitel**,
Brno (CZ); **David Schultz**, Savage, MN
(US); **Jaromir Cechak**, Brno (CZ);
Patrick Tessier, Maple Grove, MN
(US)

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(73) Assignee: **Honeywell International Inc.**, Morris
Plains, NJ (US)

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Primary Examiner — Kidest Bahta

(74) *Attorney, Agent, or Firm* — Seager, Tufte &
Wickhem, LLP

(57) **ABSTRACT**

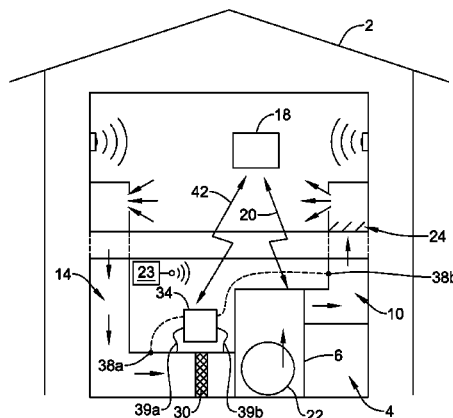
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An HVAC controller for controlling an HVAC system may be configured to enroll one or more wireless devices, and once one or more wireless devices are enrolled, to prompt the user to enter an identifier, a location, a device type and/or a function for one or more of the enrolled wireless devices. The HVAC controller may use the identifier, location and/or device type to identify each of the enrolled devices. This may facilitate a user in selecting various sensors to participate in sensor averaging, identifying where certain sensor data is originating, identifying devices having a low battery condition, as well as performing other tasks as desired.

20 Claims, 23 Drawing Sheets



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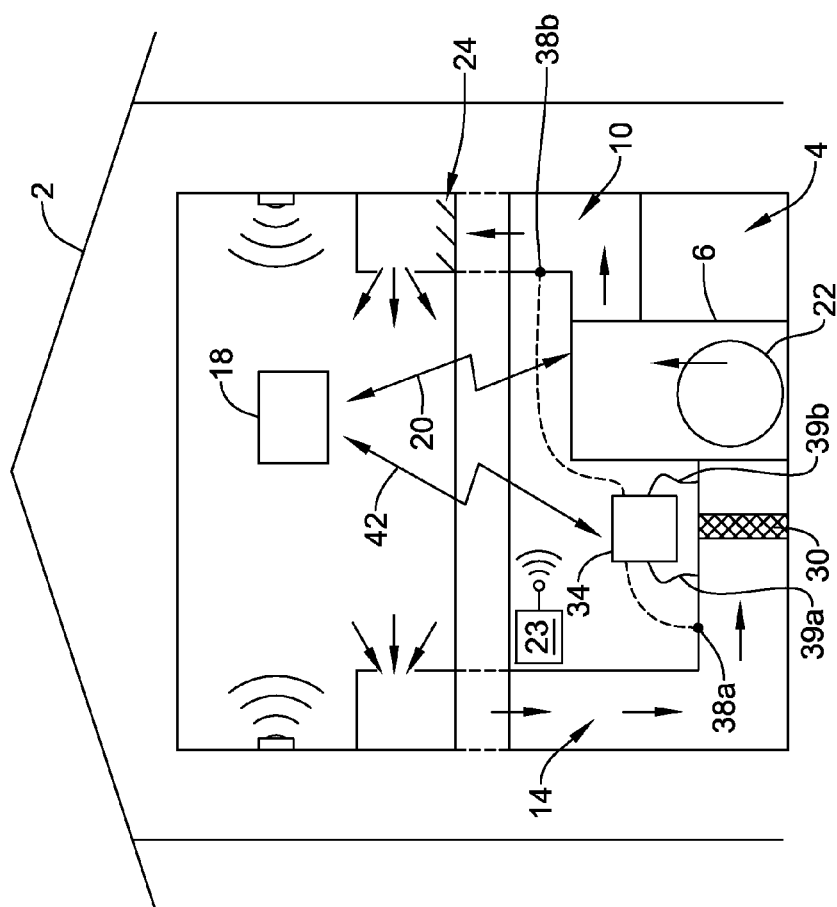


Figure 1

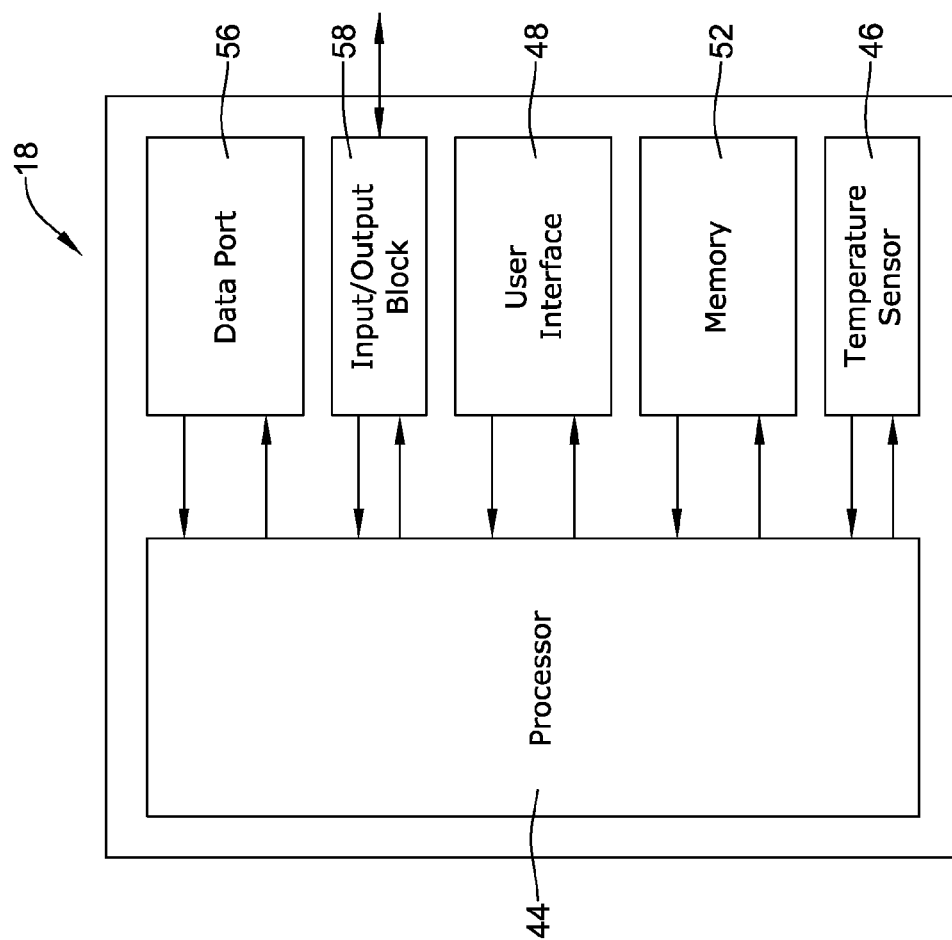


Figure 2

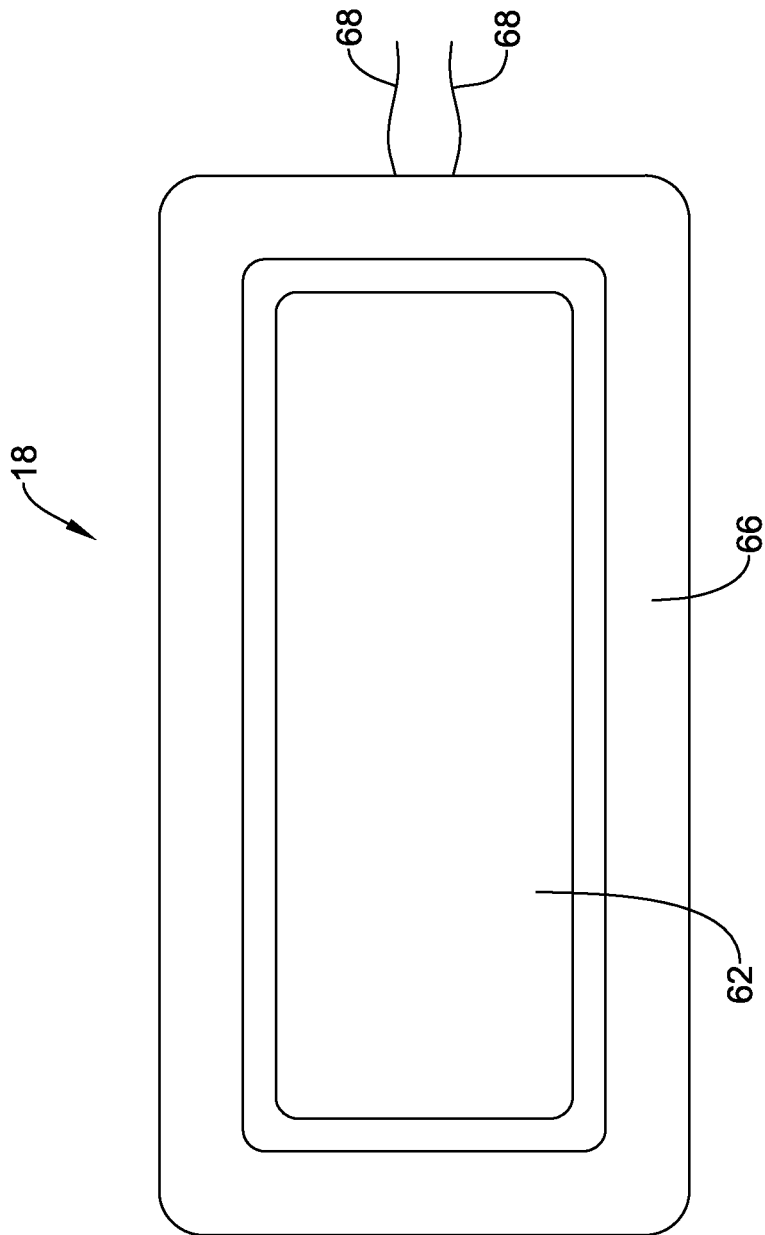


Figure 3

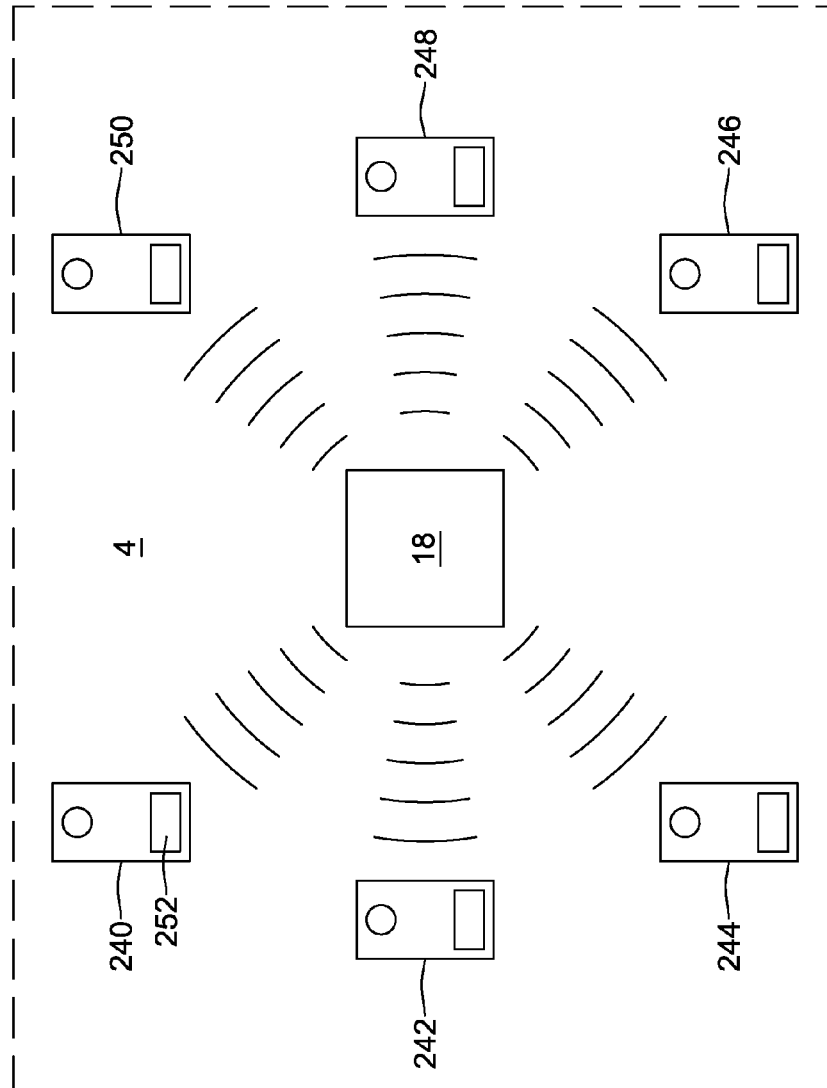
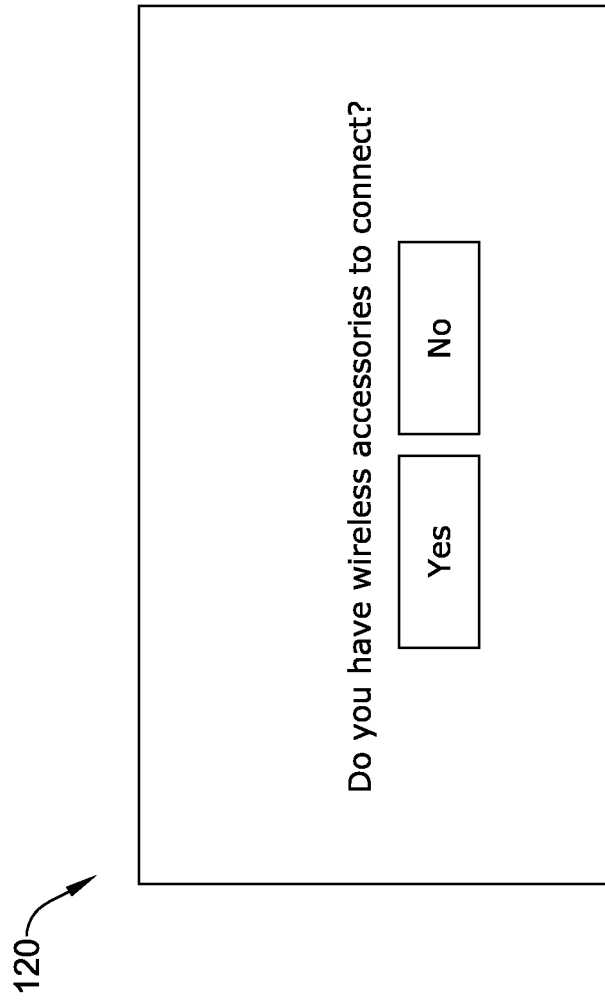


Figure 4

*Figure 5*

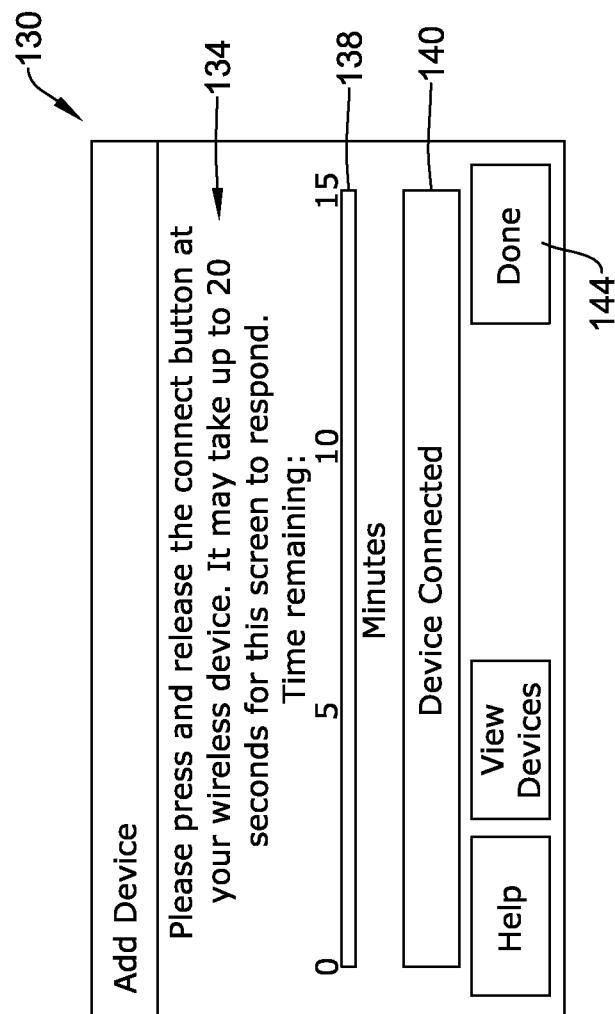


Figure 6

150

154

Please name the wireless device

162

Sensor1_

Q

W

E

R

T

Y

U

I

O

P

A

S

D

F

G

H

J

K

L

↶

Z

X

C

V

B

N

M

ⓧ

158

Cancel

123

Space

Return

Done

166

Figure 7

Figure 8 is a diagram of a user interface 170 for identifying a location for a wireless device. The interface is enclosed in a rectangular frame. At the top is a title bar 174 containing the text "Please identify a location for the wireless device". Below the title bar is a text input field 182 containing the text "Living Room_". Below the input field is a QWERTY keyboard 178. The keyboard is organized into four rows of buttons. The first row contains buttons for Q, W, E, R, T, Y, U, I, O, and P. The second row contains buttons for A, S, D, F, G, H, J, K, L, and a backspace button (represented by an 'X' in a box). The third row contains buttons for a left arrow, Z, X, C, V, B, N, M, and a right arrow. The fourth row contains buttons for "Cancel", "123", "Space", "Return", and "Done". The bottom bar 186 is located at the bottom of the interface and contains the "Cancel", "123", "Space", "Return", and "Done" buttons. The label 178 points to the keyboard area, and the label 186 points to the bottom bar.

Figure 8

190

192

Please select a device function

196 ☒ Temperature Control 194

196 ☐ Humidity Control 194

196 ☐ Dehumidification Control 194

196 ☐ View Only 194

196 ☐ None 194

198 Done

Figure 9

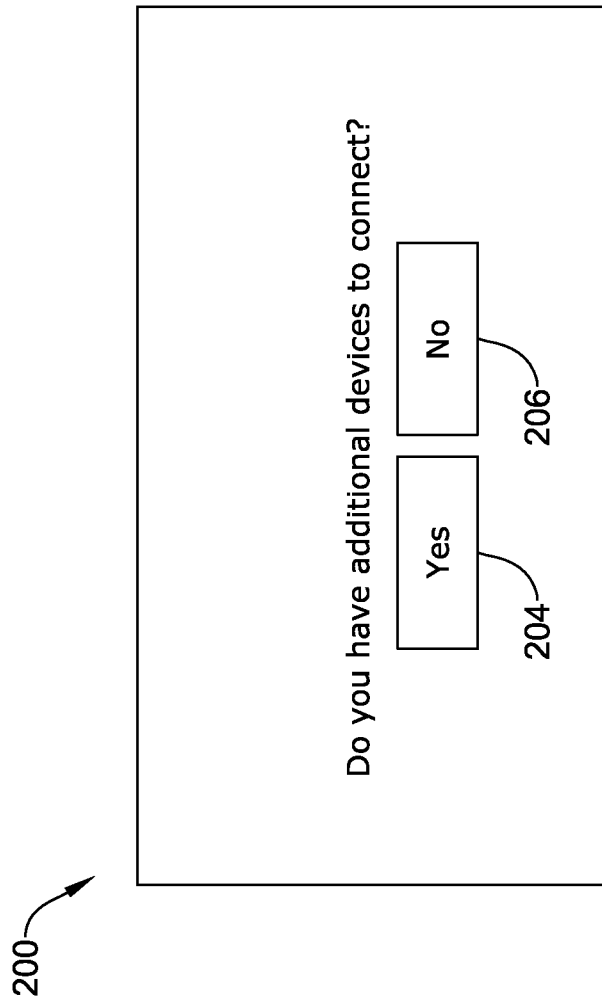


Figure 10

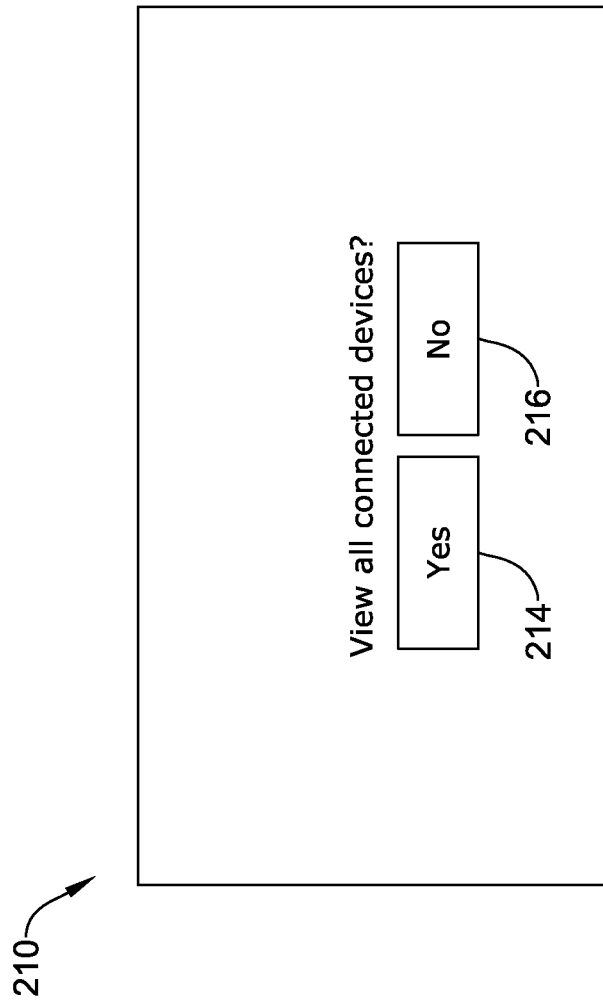


Figure 11

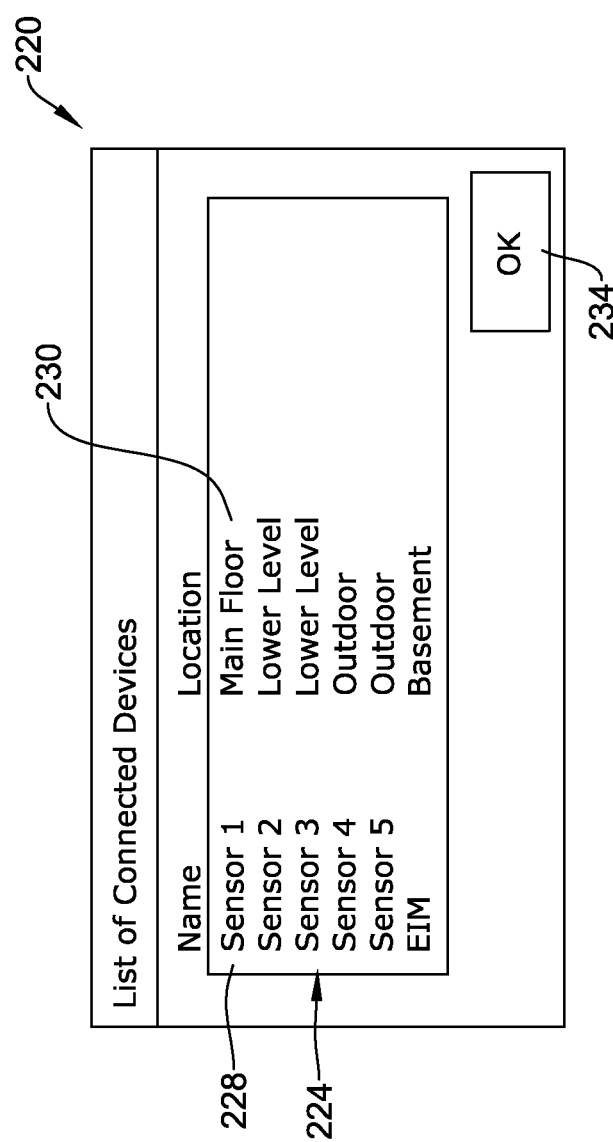


Figure 12

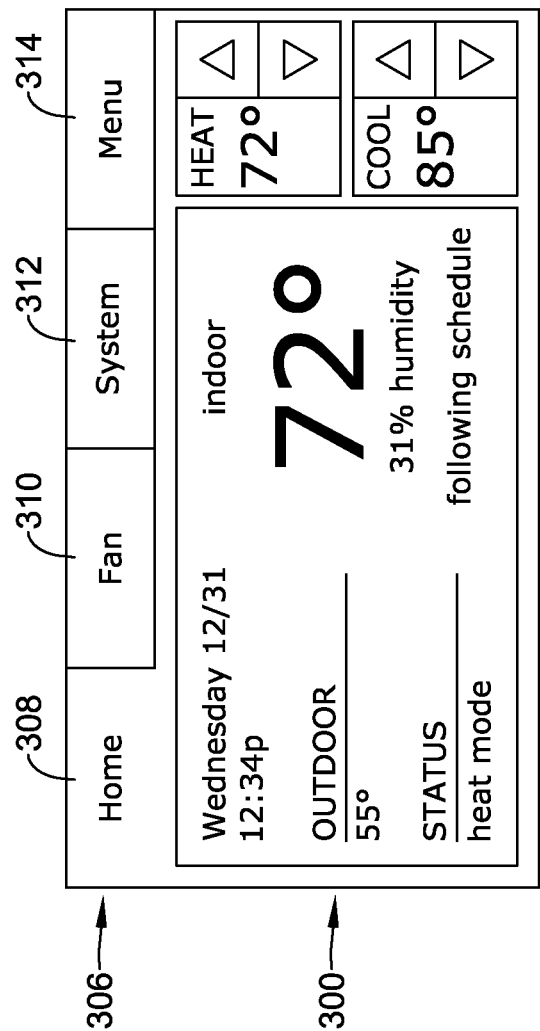


Figure 13

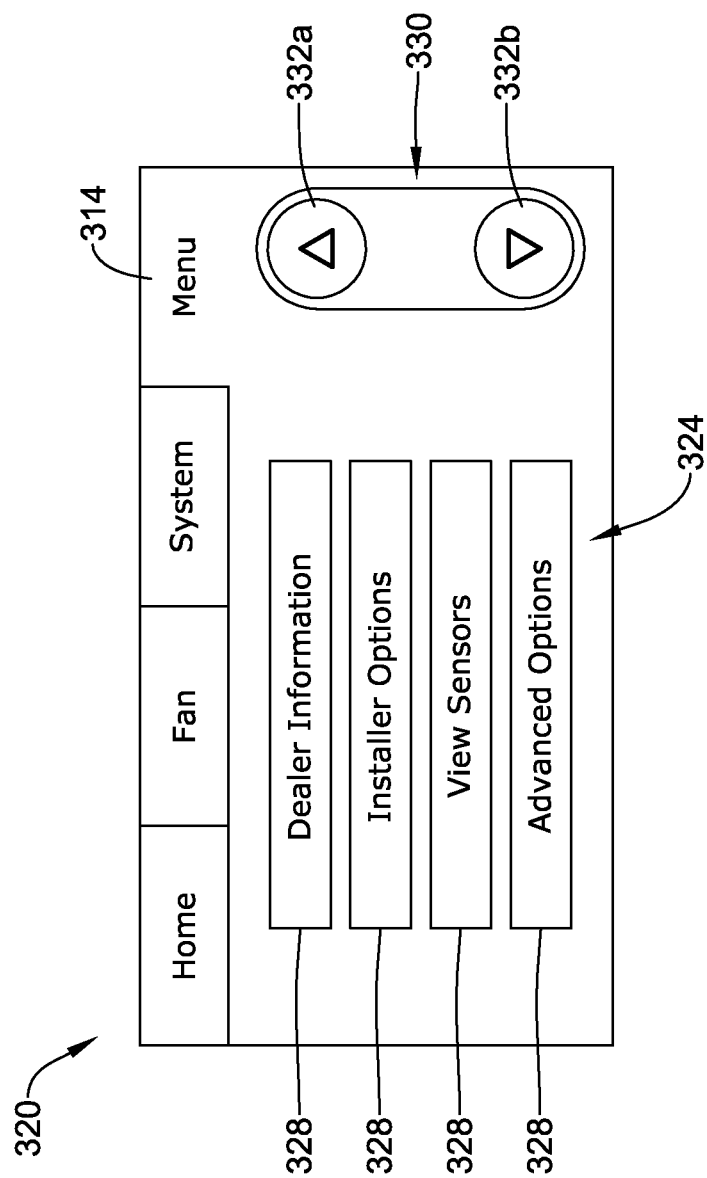


Figure 14

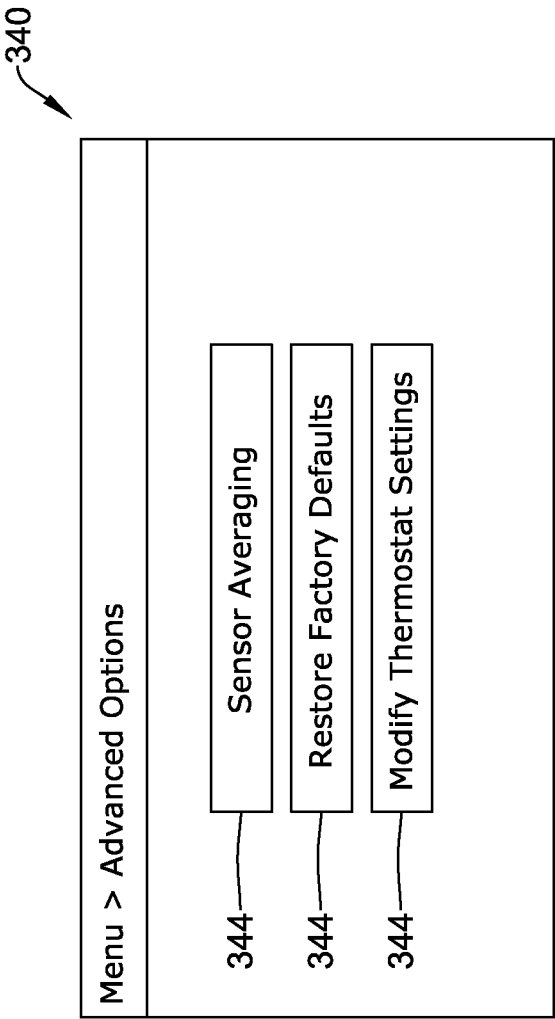


Figure 15

350

354 Which sensors will be used for Temperature Control?

360	Thermostat	<input checked="" type="checkbox"/> 362	368a
360	Sensor 1 / Living Room	<input checked="" type="checkbox"/> 362	366
360	Sensor 2 / Bedroom	<input checked="" type="checkbox"/> 362	368b
360	Sensor 3 / Garage	<input type="checkbox"/> 362	
360	Sensor 4 / Crawl Space	<input type="checkbox"/> 362	

358

372 Back

374 Help

376 Done

378 Next

Figure 16A

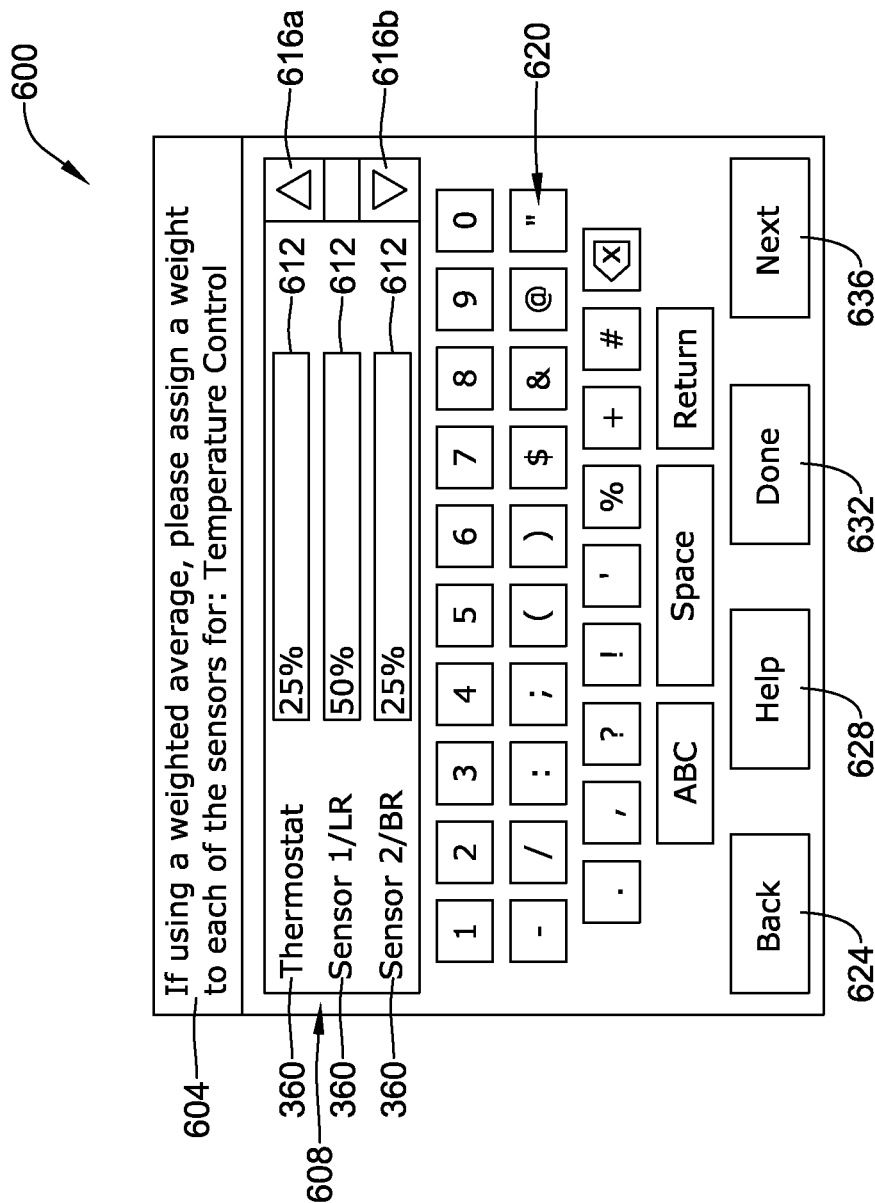


Figure 16B

380

384 Which sensors will be used for Humidification Control?

390 Thermostat	<input checked="" type="checkbox"/> 402	398a
390 Sensor 1 / Living Room	<input checked="" type="checkbox"/> 402	396
390 Sensor 2 / Bedroom	<input checked="" type="checkbox"/> 402	398b
390 Sensor 3 / Garage	<input type="checkbox"/> 402	
390 Sensor 4 / Crawl Space	<input type="checkbox"/> 402	

388

404 Back

408 Help

412 Done

416 Next

Figure 17A

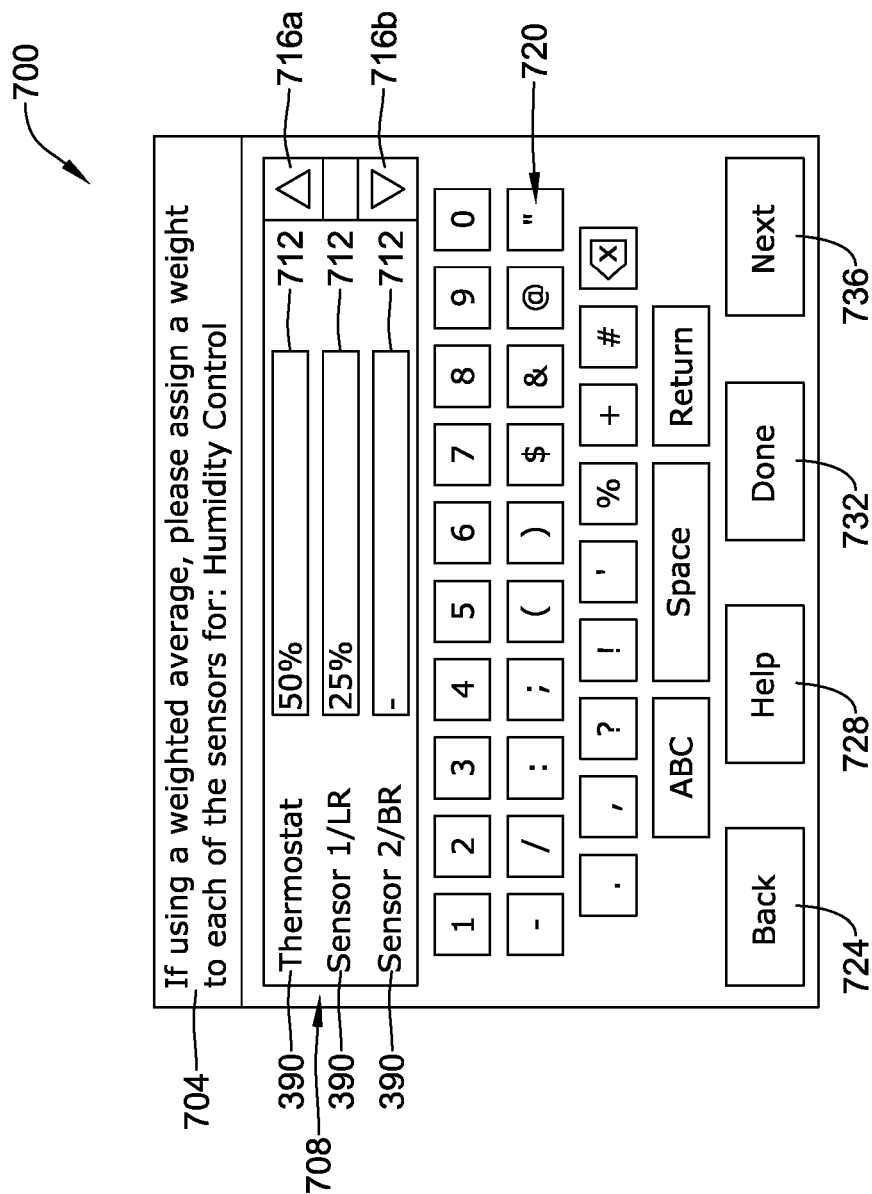


Figure 17B

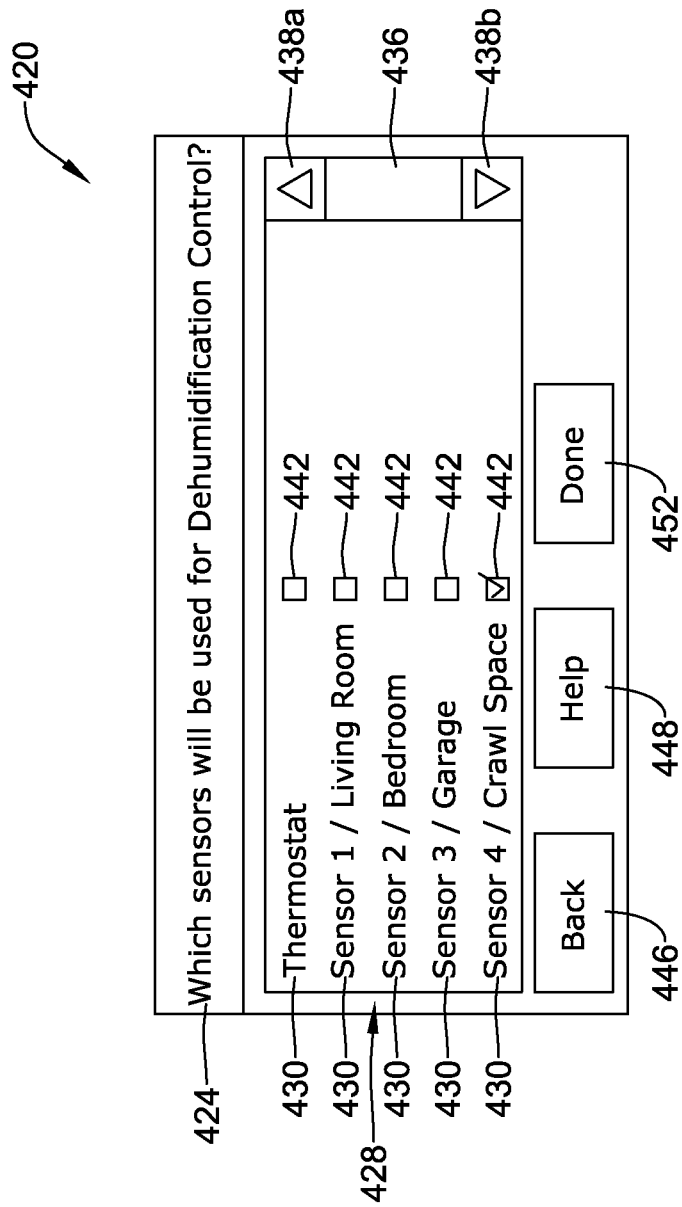


Figure 18

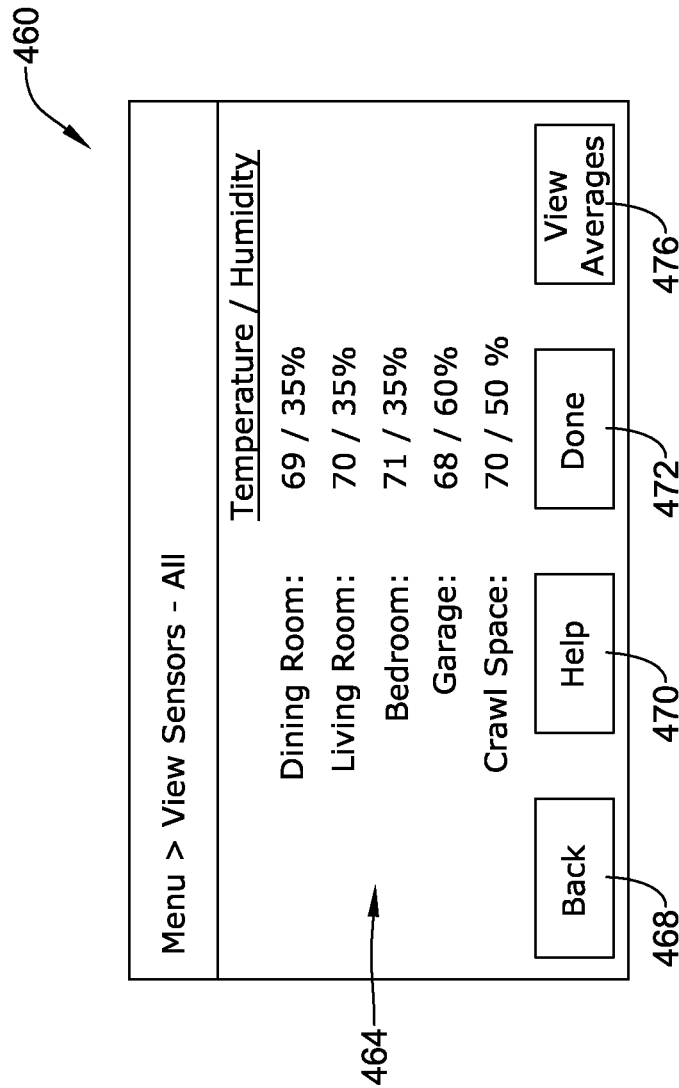


Figure 19

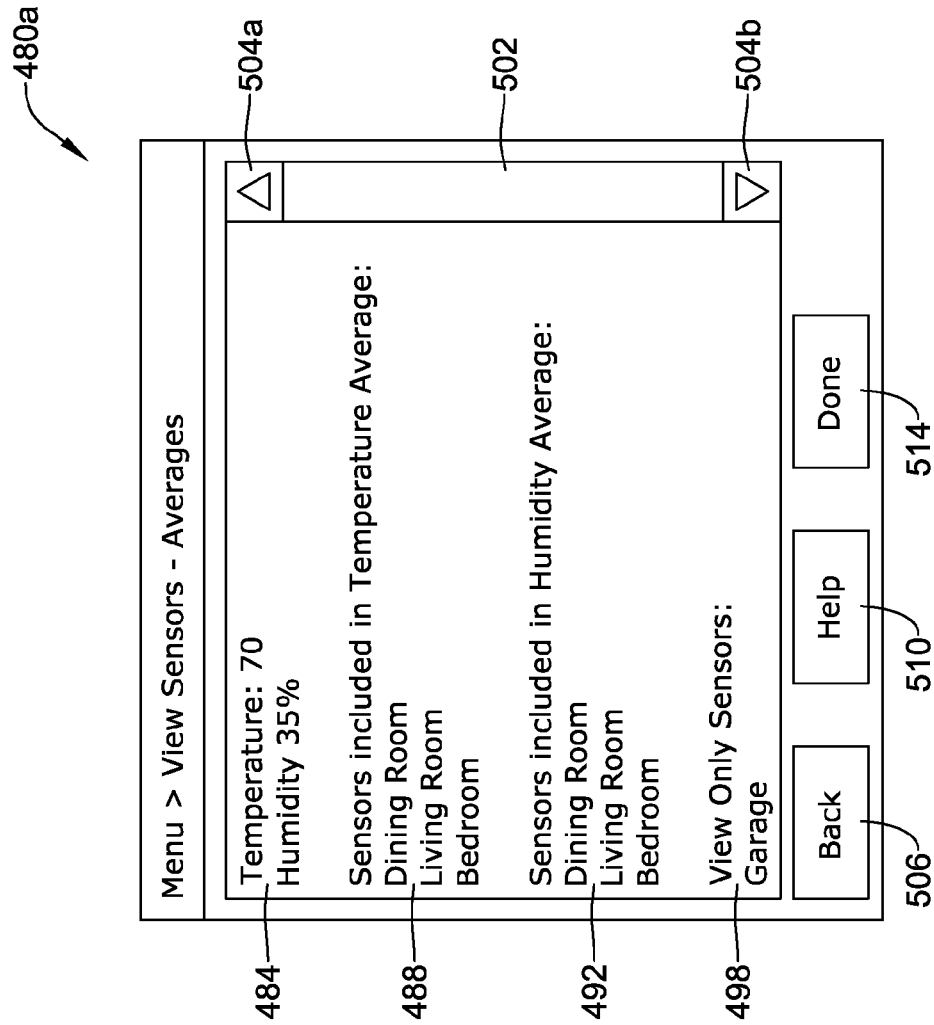


Figure 20A

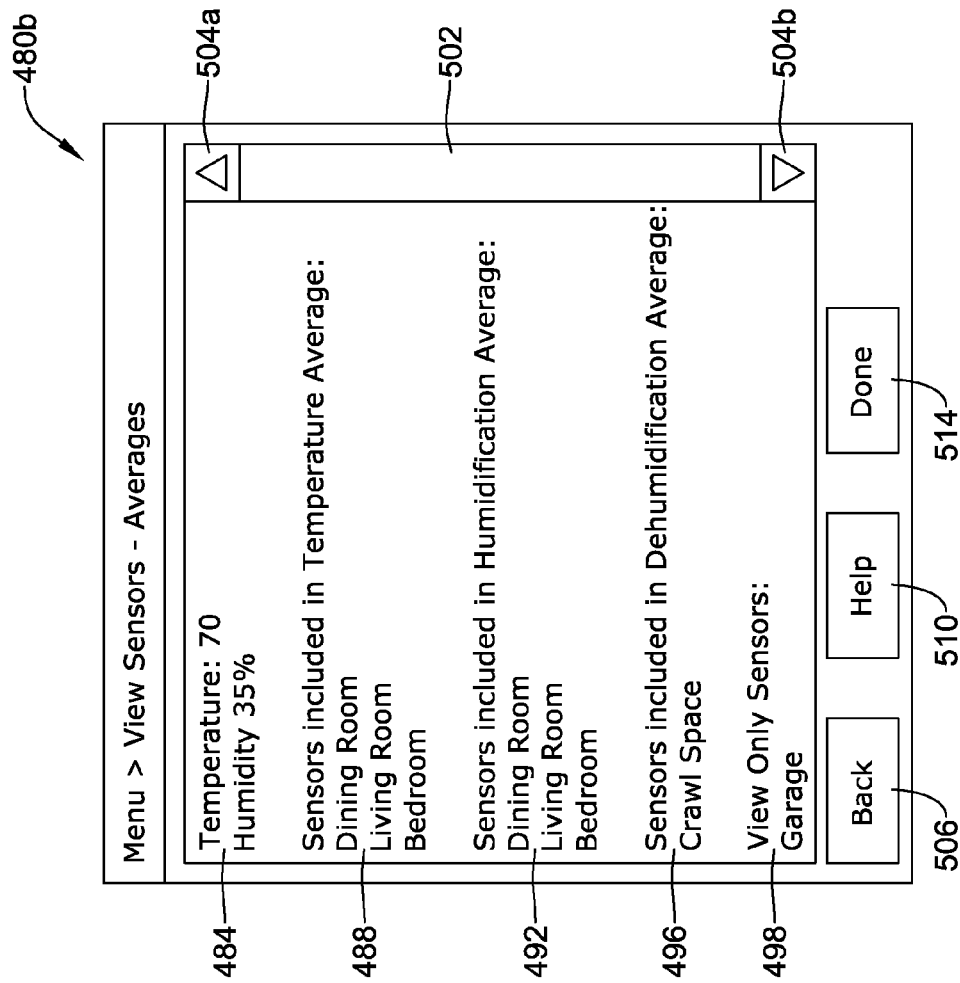


Figure 20B

1

METHOD AND SYSTEM FOR CONFIGURING WIRELESS SENSORS IN AN HVAC SYSTEM

TECHNICAL FIELD

The present disclosure relates generally to HVAC systems, and more particularly, to methods and systems for configuring wireless devices in an HVAC system.

BACKGROUND

Heating, ventilation, and/or air conditioning (HVAC) systems are often used to control the comfort level within a building or other structure. Such HVAC systems typically include an HVAC controller that controls various HVAC components of the HVAC system in order to affect and/or control one or more environmental conditions within the building. Some HVAC systems rely on one or more sensors located at various locations in or around the building to facilitate control of the one or more environmental conditions within the building.

SUMMARY

The present disclosure relates generally to HVAC systems, and more particularly, to methods and systems for configuring wireless devices in an HVAC system. In some instances, an HVAC system may include a building controller (e.g. a thermostat) and one or more wireless devices, such as a temperature sensor, a humidity sensor, an equipment interface module and/or any other suitable wireless sensor or device. The building controller may be configured to control one or more components of an HVAC system of a building. In some cases, the building controller may include a memory, a temperature sensor, an I/O block for sending and/or receiving signals to and/or from one or more components of the HVAC system including the one or more wireless devices, a controller, and a user interface having a display. The controller may be coupled to the user interface, the memory, the temperature sensor, and the I/O block.

In some cases, the controller may be configured to enroll the one or more wireless devices, and once the one or more wireless devices are enrolled, may solicit an identifier from a user for at least one of the one or more wireless devices via the user interface of the building controller. Upon acceptance of an identifier for the at least one of the one or more enrolled wireless devices, the controller may be configured to store the accepted identifier(s) in the memory of the building controller. In some cases, the controller may be configured to display a sequence of two or more screens on the display, wherein each of the two or more screens solicit information about at least one of the one or more wireless devices. The two or more screens may prompt the user to enter an identifier, a location, a device type and/or function of one or more wireless devices.

The preceding summary is provided to facilitate an understanding of some of the innovative features unique to the present disclosure and is not intended to be a full description. A full appreciation of the disclosure can be gained by taking the entire specification, claims, drawings, and abstract as a whole.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosure may be more completely understood in consideration of the following detailed description of various embodiments in connection with the accompanying drawings, in which:

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FIG. 1 is a schematic view of an illustrative HVAC system servicing a building or structure;

FIG. 2 is a schematic view of an illustrative HVAC controller;

FIG. 3 is a front view of an illustrative HVAC controller;

FIG. 4 is a schematic view of an HVAC system including a HVAC controller and a plurality of wireless devices connected to the HVAC controller;

FIGS. 5-15 show several illustrative screens that may be displayed on the display of the HVAC controllers of FIGS. 2 and 3 when in use;

FIGS. 16A-18 show several illustrative screens that may be displayed on the display of the HVAC controllers of FIGS. 2 and 3 for selecting one or more sensors to participate in sensor averaging for operation and control of an HVAC system; and

FIGS. 19 and 20A-20B show several illustrative screens that may be displayed on the display of the HVAC controllers of FIGS. 2 and 3 for viewing sensor data.

While the disclosure is amenable to various modifications and alternative forms, specifics thereof have been shown by way of example in the drawings and will be described in detail. It should be understood, however, that the intention is not to limit aspects of the disclosure to the particular embodiments described. On the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the disclosure.

DESCRIPTION

The following description should be read with reference to the drawings wherein like reference numerals indicate like elements throughout the several views. The detailed description and drawings show several embodiments which are meant to be illustrative in nature.

FIG. 1 is a schematic view of a building 2 having an illustrative heating, ventilation, and air conditioning (HVAC) system 4. While FIG. 1 shows a typical forced air type HVAC system 4, other types of HVAC systems are contemplated including, but not limited to, boiler systems, radiant heating systems, electric heating systems, cooling systems, heat pump systems, and/or any other suitable type of HVAC system 4, as desired. The illustrative HVAC system 4 of FIG. 1 includes one or more HVAC components 6, a system of ductwork and air vents including a supply air duct 10 and a return air duct 14, and at least one HVAC controller 18. The one or more HVAC components 6 may include, but are not limited to, a furnace, a heat pump, an electric heat pump, a geothermal heat pump, an electric heating unit, an air conditioning unit, a humidifier, a dehumidifier, an air exchanger, an air cleaner, a damper, a valve, and/or the like.

It is contemplated that the HVAC controller(s) 18 may be configured to control the comfort level in the building or structure by activating and deactivating the HVAC component(s) 6 in a controlled manner. The HVAC controller(s) 18 may be configured to control the HVAC component(s) 6 via a wired or wireless communication link 20. The HVAC controller(s) may wirelessly communicate with the one or more HVAC components(s) 6 following a wireless protocol such as, for example, cellular communication, ZigBee, Bluetooth, WiFi, IrDA, dedicated short range communication (DSRC), EnOcean, or any other suitable wireless protocols, as desired.

In some cases, the HVAC controller(s) 18 may be a thermostat, such as, for example, a wall mountable thermostat, but this is not required in all embodiments. Such a

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thermostat may include (e.g. within the thermostat housing) or have access to a temperature sensor for sensing an ambient temperature at or near the thermostat. In some instances, the HVAC controller(s) 18 may be a zone controller, or may include multiple zone controllers each monitoring and/or controlling the comfort level within a particular zone in the building or other structure.

An illustrative HVAC controller, which is not meant to be limiting in any way, is disclosed in: US Published Patent Application No. 20090140062, entitled "HVAC CONTROLLER THAT SELECTIVELY REPLACES OPERATING INFORMATION ON A DISPLAY WITH SYSTEM STATUS INFORMATION"; US Published Application No. 20090143880, entitled "HVAC CONTROLLER WITH CONTEXT SENSITIVE HELP SCREENS"; US Published Application No. 20090143918, entitled "METHOD AND APPARATUS FOR CONFIGURING AN HVAC CONTROLLER"; US Published Application No. 20090143916, entitled "HVAC CONTROLLER HAVING A PARAMETER ADJUSTMENT ELEMENT WITH A QUALITATIVE INDICATOR"; US Published Application No. 20090143879, entitled "HVAC CONTROLLER WITH PARAMETER CLUSTERING"; US Published Application No. 20090140056, entitled "HVAC CONTROLLER WITH QUICK SELECT FEATURE," the entireties of which are incorporated herein by reference for all purposes.

In the illustrative HVAC system 4 shown in FIG. 1, the HVAC component(s) 6 may provide heated air (and/or cooled air) via the ductwork throughout the building 2. As illustrated, the HVAC component(s) 6 may be in fluid communication with every room and/or zone in the building 2 via the ductwork 10 and 14, but this is not required. In operation, when a heat call signal is provided by the HVAC controller(s) 18, an HVAC component 6 (e.g. forced warm air furnace) may be activated to supply heated air to one or more rooms and/or zones within the building 2 via supply air ducts 10. The heated air may be forced through supply air duct 10 by a blower or fan 22. In this example, the cooler air from each zone may be returned to the HVAC component 6 (e.g. forced warm air furnace) for heating via return air ducts 14. Similarly, when a cool call signal is provided by the HVAC controller(s) 18, an HVAC component 6 (e.g. air conditioning unit) may be activated to supply cooled air to one or more rooms and/or zones within the building or other structure via supply air ducts 10. The cooled air may be forced through supply air duct 10 by the blower or fan 22. In this example, the warmer air from each zone may be returned to the HVAC component 6 (e.g. air conditioning unit) for cooling via return air ducts 14. In some cases, the HVAC system 4 may include an optional communications gateway or other device 23 that may allow one or more of the HVAC components 6, as described herein, to communicate wirelessly with one another in accordance with a wireless communications protocol such as, for example, cellular communication, ZigBee, Bluetooth, WiFi, IrDA, dedicated short range communication (DSRC), EnOcean, or any other suitable wireless protocols, as desired. In some cases, the communications gateway 23 may facilitate communication between the various HVAC components 6 over a local area network (LAN), a wide area network (WAN), or the internet. These are just some examples.

In some cases, the system of vents or ductwork 10 and/or 14 can include one or more dampers 24 to regulate the flow of air, but this is not required. For example, one or more dampers 24 may be coupled to one or more HVAC controller(s) 18, and can be coordinated with the operation of one or more HVAC components 6. The one or more

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HVAC controller(s) 18 may actuate dampers 24 to an open position, a closed position, and/or a partially open position to modulate the flow of air from the one or more HVAC components 6 to an appropriate room and/or zone in the building or other structure. The dampers 24 may be particularly useful in zoned HVAC systems, and may be used to control which zone(s) receives conditioned air from the HVAC component(s) 6.

In many instances, one or more air filters 30 may be used to remove dust and other pollutants from the air inside the building 2. In the example shown in FIG. 1, the air filter(s) 30 is installed in the return air duct 14, and may filter the air prior to the air entering the HVAC component 6, but it is contemplated that any other suitable location for the air filter(s) 30 may be used. The presence of the air filter(s) 30 may not only improve the indoor air quality, but may also protect the HVAC components 6 from dust and other particulate matter that would otherwise be permitted to enter the HVAC component 6.

In some cases, and as shown in FIG. 1, the illustrative HVAC system 4 may include an equipment interface module (EIM) 34. When provided, the equipment interface module 34 may be configured to measure or detect a change in a given parameter between the return air side and the discharge air side of the HVAC system 4. For example, the equipment interface module 34 may be adapted to measure a difference in temperature, flow rate, pressure, or a combination of any one of these parameters between the return air side and the discharge air side of the HVAC system 4. In some cases, the equipment interface module 34 may be adapted to measure the difference or change in temperature (delta T) between a return air side and discharge air side of the HVAC system 4 for the heating and/or cooling mode. The delta T for the heating mode may be calculated by subtracting the return air temperature from the discharge air temperature (e.g. delta T=discharge air temp.-return air temp.). For the cooling mode, the delta T may be calculated by subtracting the discharge air temperature from the return air temperature (e.g. delta T=return air temp.-discharge air temp.).

When provided, the equipment interface module 34 may be configured to communicate with the HVAC controller 18 via, for example, a wired or wireless communication link 42. In other cases, the equipment interface module 34 may be incorporated or combined with the HVAC controller 18. In either cases, the equipment interface module 34 may communicate, relay or otherwise transmit data regarding the selected parameter (e.g. temperature, pressure, flow rate, etc.) to the HVAC controller 18. In some cases, the HVAC controller 18 may use the data from the equipment interface module 34 to evaluate the system's operation and/or performance. For example, the HVAC controller 18 may compare data related to the difference in temperature (delta T) between the return air side and the discharge air side of the HVAC system 4 to a previously determined delta T limit stored in the HVAC controller 18 to determine a current operating performance of the HVAC system 4.

In some cases, the equipment interface module 34 may include a first temperature sensor 38a located in the return (incoming) air duct 14, and a second temperature sensor 38b located in the discharge (outgoing or supply) air duct 10. Alternatively, or in addition, the equipment interface module 34 may include a differential pressure sensor including a first pressure tap 39a located in the return (incoming) air duct 14, and a second pressure tap 39b located downstream of the air filter 30 to measure a change in a parameter related to the amount of flow restriction through the air filter 30. In some

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cases, the equipment interface module 34, when provided, may include at least one flow sensor that is capable of providing a measure that is related to the amount of air flow restriction through the air filter 30. In some cases, the equipment interface module 34 may include an air filter

monitor. These are just some examples. FIG. 2 is a schematic view of an illustrative HVAC controller 18. In some instances, HVAC controller 18 may be a thermostat and may include a temperature and/or humidity sensor, but this is not required. In the illustrative embodiment of FIG. 2, HVAC controller 18 includes a controller (e.g. microprocessor, microcontroller, etc.) 44, a temperature sensor and/or humidity sensor 46, a user interface 48, and a memory 52. In some cases, the HVAC controller 18 may include an input/output block (I/O block) 58 for receiving one or more signals from the HVAC system and/or for providing one or more control signals to the HVAC system. The I/O block 58 may communicate with one or more HVAC components 6 of the HVAC system 4. In some cases, the I/O block 58 may communicate with another controller, which is in communication with one or more HVAC components 6 of the HVAC system 4, such as a zone panel in a zoned HVAC system. The I/O block 58 may also be configured to wirelessly communicate with one or more wireless devices. The controller 44 may be coupled to the user interface 48, the memory 52, the temperature sensor 46, and the I/O block 58.

The controller 44 of the illustrative HVAC controller 18 may operate in accordance with an algorithm that controls or at least partially controls one or more HVAC components 6 of an HVAC system such as, for example, HVAC system 4 shown in FIG. 1. The controller 44 may, for example, operate in accordance with an algorithm that provides temperature set points, starting and/or ending times, and the like. Additionally, in some cases, HVAC controller 18 may include a timer (not shown). The timer may be integral to the controller 44 or may be provided as a separate component.

In the illustrative embodiment of FIG. 2, the user interface 48 may be any suitable user interface that permits HVAC controller 18 to display and/or solicit information, as well as accept one or more user interactions with the HVAC controller 18. For example, the user interface 48 may permit a user to enter data such as temperature set points, humidity set points, starting times, ending times, diagnostic limits, conditions under which diagnostic limits may be suspended, responses to alerts, and the like. In some cases, the user interface 48 may include a display and a distinct keypad. A display may be any suitable display. In some instances, a display may include or may be a liquid crystal display (LCD), and in some cases a fixed segment display or a dot matrix LCD display. If desired, user interface 48 may be a touch screen LCD panel that functions as both display and keypad. In some instances, a touch screen LCD panel may be adapted to solicit values for a number of operating parameters and/or to receive such values, but this is not required.

The memory 52 of the illustrative HVAC controller 18 may be in communication with the controller 44. Memory 52 may be used to store any desired information, such as the aforementioned control algorithm, set points, schedule times, diagnostic limits such as, for example, differential pressure limits, delta T limits, and the like. Memory 52 may be any suitable type of storage device including, but not limited to, RAM, ROM, EPROM, flash memory, a hard drive, and/or the like. In some cases, controller 44 may store information within memory 52, and may subsequently retrieve the stored information.

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In some cases, as illustrated in FIG. 2, HVAC controller 18 may include a data port 56. Data port 56 may be a wireless port such as a Bluetooth™ port or any other wireless protocol. In other cases, data port 56 may be a wired port such as a serial port, a parallel port, a CATS port, a USB (universal serial bus) port, and/or the like. In some instances, data port 56 may be a USB port and may be used to download and/or upload information from a USB flash drive or some other data source. Other remote devices may also be employed, as desired.

Data port 56 may be configured to communicate with controller 44 and may, if desired, be used to upload information to controller 44 and/or download information from controller 44. Information that can be uploaded and/or downloaded may include, for example, values of operating parameters. In some instances, data port 56 may be used to upload a previously-created thermostat configuration into HVAC controller 18, thereby hastening the programming process. In some cases, data port 56 may be used to download a thermostat configuration that has been created using HVAC controller 18, so that the thermostat configuration may be transferred to other similar thermostats, hastening their programming process. In some cases, data port 56 may be used to upload and/or download information pertaining to an HVAC dealer or contractor, if desired. In some cases, data port 56 may be used to download data stored within the memory 52 for analysis. For example, data port 56 may be used to download a faults and/or alerts log or parts thereof to a remote device such as a USB memory stick (also sometimes referred to as a thumb drive or jump drive), personal computer, laptop, iPad® or other tablet computer, PDA, smart phone, or other remote device, as desired. In some cases, the data may be convertible to an MS EXCEL®, MS WORD®, text, XML, and/or Adobe PDF® file, but this is certainly not required.

FIG. 3 is a front view of an illustrative HVAC controller 18. In some cases, HVAC controller 18 may be configured to provide substantial display and/or programming functionality. In the example shown in FIG. 3, HVAC controller 18 may include a display 62 that is disposed within a housing 66 but viewable externally from the housing 66. In some cases, display 62 may be a touch screen LCD display. If desired, display 62 may be a dot matrix touch screen LCD display. A dot matrix touch screen LCD display is a touch screen LCD that permits images such as letters, numbers, graphics, images, and the like to be displayed anywhere on the LCD, rather than being confined to predetermined locations such as is the case with a fixed segment type of LCD display. Housing 66 may be formed of any suitable material, such as a polymeric material. In some cases, the housing 66 may be formed such that it defines a data port 56 (see FIG. 2). The housing 66 may also include suitable wiring and/or other electrical connections 68 such that the HVAC controller 18 may be electrically coupled to the HVAC system 4.

The HVAC system 4 may also include one or more wireless devices that may be configured to communicate and/or interact via a wireless communication link (e.g. I/O block 58) with the HVAC controller 18. Exemplary wireless devices that may be incorporated into the HVAC system 4 include, but are not limited to, temperature sensors, humidity sensors, gas sensors, an equipment interface module, another thermostat, a zone control panel, a damper, a valve, and/or any other suitable wireless sensor or device. In many cases, the one or more wireless devices may operate on battery power. In some cases, the one or more wireless devices may have a wired auxiliary source of back-up power in the event of battery failure.

FIG. 4 is a schematic view of a portion of the HVAC system 4 including an HVAC controller 18 and a number of wireless devices 240, 242, 244, 246, 248, and 250 in communication with the HVAC controller 18. As shown in FIG. 4, the one or more wireless devices 240, 242, 244, 246, 248, and 250 may include, but are not limited to, an indoor air temperature sensor 240, an outdoor air temperature sensor 242, an indoor humidity sensor 244, an outdoor humidity sensor 246, a remote control unit 248, a wireless adapter 520, and/or any other suitable wireless device or sensor. These are just some example wireless devices that may be connected to the HVAC controller 18 and incorporated into the HVAC system 4. In some cases, the HVAC system 4 may include indoor air temperature sensors 240 located at different locations throughout the building or structure 2. In the example shown in FIG. 1, the HVAC system 4 may include a wireless indoor air temperature sensor 40 mounted to a wall of the building or structure at a location that is remote from the HVAC controller(s) 18. In some cases, the HVAC system 4 may also include an outdoor temperature sensor 242 and/or an outdoor humidity sensor 246 installed at a location external to the building or structure 2. In some cases, a remote control unit 248 may be provided for communicating with and/or controlling the one or more wireless devices and/or HVAC controller 18, if desired.

In some cases, the one or more wireless devices 240, 242, 244, 246, 428, and/or 250 may be configured to send commands to the HVAC controller 18 via a one-way, wireless communication link. In other cases, the one or more wireless devices 240, 242, 244, 246, 428, and/or 250 may be configured to send and/or receive commands to and from the HVAC controller 18 via a two-way, wireless communication link. The communication link established between the one or more wireless devices 240, 242, 244, 246, 428, and/or 250 and the one or more HVAC controllers 18 may be a direct communication link, or alternatively, an indirect communication link where communication between the control unit and the one or more HVAC controllers 18 is routed through a communications device such as, for example, communications gateway 23 as shown in FIG. 1.

In some instances, the one or more wireless devices 240, 242, 244, 246, 428, and/or 250 may be installed at the same time as the HVAC controller(s) 18 (e.g. new installation). In other instances, the one or more wireless devices 240, 242, 244, 246, 428, and/or 250 may be installed in a building or structure that already has an existing HVAC controller(s) 18 (e.g. post-installation). In either case, a communication link may need to be established between the one or more wireless devices 240, 242, 244, 246, 428, and/or 250 and the HVAC controller(s) 18 so that the HVAC controller(s) 18 may send and/or receive data and/or commands to and/or from the wireless devices.

In some instances, such as when a wireless device (e.g. wireless sensor 240) is being added to an HVAC system 4 having an existing HVAC controller 18, a communication link between the wireless sensor 240 and the HVAC controller 18 may be established by selecting a connect button 252 provided on the wireless sensor 240. Selection of the connect button 252 may cause the wireless sensor 240 to send a signal to the existing HVAC controller 18, commanding the HVAC controller 18 to recognize and enroll the wireless sensor 240 as part of the HVAC system 4, and establish a communication link between the wireless sensor 240 and the HVAC controller 18. In some cases, when the connect button 252 on the wireless device 240 is activated and the wireless device 240 is enrolled with the HVAC

controller 18, the newly enrolled wireless device 240 may be identified on the display 62 of the HVAC controller 18. This feature may provide visual confirmation to the installer that the wireless device (e.g. wireless sensor 240) has been successfully enrolled with the HVAC controller 18.

In other instances, such as when the one or more wireless devices 240, 242, 244, 246, 428, and/or 250 are installed at the same time as the HVAC controller 18, the HVAC controller may display one or more screens on the display 62 of the user interface 48 that may guide a user through establishing a communication link between the HVAC controller 18 and the one or more wireless devices. Again, the communication link may be a one-way or a two-way communication link. FIGS. 5-12 show several illustrative screens that may be displayed on the display 62 of an exemplary HVAC controller 18 during set-up of the HVAC controller 18 with one or more wireless devices such as, for example, wireless indoor air sensor 240.

In some cases, during the initial set-up of the HVAC controller 18, the HVAC controller 18 may display a user query screen 120, as shown in FIG. 5, that queries the user about any wireless devices such as, for example, wireless sensor 240 that may need to be connected to the HVAC controller 18 as a part of the controller set-up process. User query screen 120 may include one or more options for responding to the user query presented on the user query screen 120. For example, as shown, user query screen 120 may include a first option 124 labeled "Yes" and second option 126 labeled "No." Selection of the first option 124 labeled "Yes" may cause the HVAC controller 18 to subsequently display a connection prompt screen 130, as shown in FIG. 6, which may prompt the user to take a certain action to facilitate connection of a selected wireless device (e.g. wireless sensor 240) with the HVAC controller 18.

In some cases, connection prompt screen 130 may include a first user message 134 that instructs to the user to press and release a connect button (e.g. connect button 252 shown in FIG. 4) of the wireless device (e.g. wireless sensor 240). Additional information that may be useful to the user may be optionally included within the first user message 134. In some cases, connection prompt screen 130 may also include a status bar 138 that may display the amount of time that has lapsed since connection between the HVAC controller 18 and the wireless device (e.g. wireless sensor 240) was attempted but, this is not required. Upon successful connection of the HVAC controller 18 with the wireless device (e.g. wireless sensor 240), the HVAC controller 18 may display a second user message 140 on the connection prompt screen 130 indicating that a new device has been enrolled and added. When provided, the second user message 140 may be displayed on another subsequent screen or a pop-up screen, but this is not required. In some cases, selection of the button 144 labeled "Done" or "Finished" may cause the HVAC controller 18 to display additional screens related to setting up the HVAC controller 18, but this is not required. In other cases, selection of the "Done" button 144 may cause the HVAC controller 18 to display a home screen such as shown in FIG. 13, discussed in greater detail below. It will be understood that a similar set of screens may be displayed for any wired accessories needing connection to the HVAC controller 18, if desired.

In some cases, upon successful connection of the HVAC controller 18 with the wireless device (e.g. wireless sensor 240), the HVAC controller 18 may display a first user prompt screen 150 that may prompt the user to name the wireless device that was just connected (see FIG. 7). In some cases, screen 150 may include a user message 154 which

may prompt the user to name the wireless device. Screen 150 may also include a keyboard 158 that may be used by the user to enter a name for the device. In some cases, the keyboard 158 may be a virtual keyboard. In other cases, the keyboard 158 may be a physical keyboard and may include hard buttons to facilitate entry of the device name. The device name may be displayed in a name display region 162 positioned above or below the keyboard 158. In some cases, the device name may be displayed in the name display region 162 as the user is entering the name of the device using keyboard 158. Selection of button 166 labeled “ENTER” or “DONE” may cause the HVAC controller 18 to accept the device name entered by the user in name display region 162, and to assign this name to the wireless device.

Selection of the “DONE” button 166 may also cause the HVAC controller 18 to display a second user prompt screen 170 that may prompt the user to identify the location of the wireless device (see FIG. 8). In some cases, screen 170 may include a user message 174 which may prompt the user to identify the location of the wireless device. Screen 170 may also include a keyboard 178 that may be used by the user to enter the location associated with the wireless device. In some cases, the keyboard 178 may be a virtual keyboard. In other cases, the keyboard 178 may be a physical keyboard including hard buttons. The device location may be displayed in a location identification region 182 positioned above or below the keyboard 178. In some cases, the identified location may be displayed in the location identification region 182 as the user identifies the location of the wireless device using the keyboard 178. Selection of button 186 labeled “ENTER” or “DONE” may cause the HVAC controller 18 to accept the identified location entered by the user and to associate the location with the wireless device. For example, through screen 150 a user may name a wireless indoor air temperature sensor 40 “Sensor1” and through screen 170, the user may identify the location of “Sensor1” as the “Living Room.” The HVAC controller 18 may then store the name of the wireless device and its location in the controller memory.

Selection of button 186 may cause the HVAC controller 18 to display a third user prompt screen 190 that may prompt the user to identify a function associated with the connected wireless device (see FIG. 9). In some cases, screen 190 may include a user prompt 192 that may prompt the user to select a device function. In some cases, screen 190 may provide a list of individually selectable device functions 194 for the user’s selection. Exemplary device functions include, but are not limited to, temperature control, humidification control, dehumidification control, view only, read only, and none of the above. The “View Only” device function 194 may be selected in certain cases where, for example, the wireless device is a temperature or a humidity sensor, but its temperature or humidity reading is not to be used to control the operation of the HVAC system 4. The option labeled “None” may be used, for example, for non-sensor type devices. Selection indicator boxes 196 may be optionally displayed adjacent to each of the individually selectable device functions 194. The selection indicator boxes 196 may include a check mark, an “X”, a dot, filled in, or include any other suitable selection indicator as desired. In some cases, more than one device function may be associated with a selected wireless device. Selection of the button 198 labeled “OK” or “DONE” may cause the HVAC controller 18 accept the selection and associate one or more device functions with the connected wireless device.

Selection of the “Done” button 198 may cause the HVAC controller 18 to display a user query screen 200, as shown in FIG. 10, which may query a user about additional devices to be connected. User query screen 200 may include one or more options for responding to the user query presented on the user query screen 200. For example, as shown, user query screen 200 may include a first option 204 labeled “Yes” and second option 206 labeled “No”. Selection of the first option 204 labeled “Yes” may cause the HVAC controller 18 to subsequently display screens 130, 150, 170, and 190 as described above with reference to FIGS. 6-9, which may prompt the user to connect an additional device (screen 130 of FIG. 6), to name and identify the location of the additional wireless device (screens 150 and 170 of FIGS. 7 and 8), and/or to identify a device function of the additional wireless device (screen 190 of FIG. 9). The user may continue the steps outlined with reference to FIGS. 6-10 for connecting wireless devices to the HVAC controller 18 until all of the desired wireless devices are connected.

In the example shown, after connection of the last wireless device, the user may select the second option 206 labeled “No” in response to the user query presented on user query screen 200 of FIG. 10. In some cases, this may cause the HVAC controller 18 to display a subsequent user query screen 210, as shown in FIG. 11, which may query the user about viewing the connected devices. Again, user query screen 210 may include a first option 214 labeled “Yes” and a second option 216 labeled “No.” Selection of the second option 216 labeled “No” may cause the HVAC controller 18 to display a home screen such as, for example, home screen 300 shown in FIG. 13. Selection of the first option 214 labeled “Yes” may cause the HVAC controller 18 to display a subsequent screen 220, as shown in FIG. 12, which provides a list 224 of the connected devices, and may include the device name 228 and the device location 230. In some cases, the list 224 may be presented in a table format. The table may be a scrolling table in which case, the screen 220 may also include a scroll bar or first and second arrows keys (not shown) for navigating the table. In some cases, each device name 228 may be individually selectable such that a user may select a device name to view more information about the selected device. For example, a user may select device name “Sensor1” to view the device function by simply touching “Sensor1”. The additional information about the selected device may be displayed on separate screen, or a “pop-up” screen that may be overlaid on screen 220. In some cases, the device function may be displayed adjacent the device name 228 and the device location 230. The user may select the button 234 labeled “OK” or “DONE” when they are finished viewing the list of connected devices. Selection of the button 234 labeled “OK” or “DONE” may cause the HVAC controller to display a home screen such as, for example, home screen 300 shown in FIG. 13.

Naming and identifying the location of each of the wireless devices connected to the HVAC controller 18 may be useful under many circumstances. For example, in some circumstances, it may be useful to identify if the HVAC controller 18 is controlling the system according to temperature and/or humidity levels sensed by the HVAC controller 18 itself and/or according to temperature and/or humidity levels sensed by one or more sensors located at one or more remote locations. This information may be displayed on the display 62 of the HVAC controller 18. In some cases, the information may be displayed as a brief informational statement on the display 62 adjacent the current temperature and/or humidity level reading. The brief infor-

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mation statement may indicate that the HVAC controller **18** is “sensing from this device,” “sensing from remote location,” “sensing using average sensor value,” “sensing using weighted average sensor value,” and the like. These are just some examples. If sensing from a single location, the informational statement may specify the location.

Another circumstance in which naming and identifying the location of each of the wireless devices connected to the HVAC controller **18** may be useful is when a battery condition in one of the devices becomes low. In some cases, at least one of the wireless devices, as described herein, may be configured to send a signal indicative of a low battery condition when battery level in the wireless device is low. The HVAC controller **18** may receive the signal indicative of a low battery condition from the wireless device and, in response, may display an alert on the display **62** of the HVAC controller **18**, indicative of a low battery condition in the wireless device. The alert displayed on the display **62** of the HVAC controller **18** may identify the name of the wireless device having the low battery condition. In some cases, the alert may include the device name and/or the device location. This may make it easier for a user to identify and locate the particularly wireless device having the low battery condition for battery replacement. In some cases, the wireless device may be further configured to activate an alert on the wireless device itself that is indicative of the low battery condition. The alert that is activated on the wireless device itself may include, for example, a flashing or blinking light such as a light emitting diode (LED), which may be visible to the user. In other cases, the alert may include an intermittent beep or other audible sound that may indicate to the user that battery level in the wireless device is low. These are just some examples.

In some cases, at least one of the wireless devices, as described herein, may be configured to detect a first low battery condition and to send a first signal indicative of the first low battery condition to the HVAC controller **18**. In addition, the at least one wireless device may be configured to detect a second low battery condition after further battery depletion, and to send a second signal indicative of the second low battery condition to the HVAC controller. In response to the detection of a second low battery condition, the wireless device may activate an alert on the wireless device itself that is indicative of the second low battery condition. The alert may be a visual or audible alert, as described above. The HVAC controller **18** may also display an alert on the display **62** of the HVAC Controller **18**. In some cases, the alert displayed on the display **62** of the HVAC controller **18** in response to the second low battery condition may be more urgent and/or noticeable than the alert displayed in response to the first low battery condition. Also, and to conserve battery power, it is contemplated that the wireless device may not provide any alert (e.g. flashing light or audible alarm) in response to the first low battery condition, but may provide an alert in response to the second low battery condition.

FIG. **13** provides an example of a home screen **300** that may be displayed by an HVAC controller **18** on its display **62** when no data entry is underway for a period of time, when a user selects a home screen button or, in some cases, after the user has finished adding one or more wireless devices to the HVAC system **4**, as described above with reference to FIGS. **5-10**. The illustrative home screen **300** of FIG. **13** may include a navigational bar **306** along the top. Navigational bar **306** may be considered as providing top level navigation. In some cases, if desired, navigational bar **306** may include one or more of a HOME button **308**, a FAN

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button **310**, a SYSTEM button **312** and/or a MENU button **314**. In the example shown, the user may access one or more menus from which the user may make a temperature set point change, a humidity set point change, an indoor air quality change, a programmable schedule change, a system mode change, a fan setting change, an installer set-up change, an exit/entry remote setting change, among others.

FIG. **14** shows an example of a menu screen **320** that may be displayed when a user selects the MENU button **314** on home screen **300** of FIG. **13**. The illustrative menu screen **320** may include a table **324** that includes one or more individually selectable menu options **328** that may be selected by the user. In some cases, the table **324** may be a scrolling table, in which case the menu screen **320** may also include a scroll bar **330** including first and second arrows **332a**, **332b** that may facilitate a user in scrolling through the available menu options **328**. In some cases, a menu option **328** labeled “Advanced Options” may be provided. Selection of the menu option **328** labeled “Advanced Options” may cause the HVAC controller **18** to display an Advanced Options menu screen **340**, as shown in FIG. **15**. The Advanced Options menu screen **340** may list one or more individually selectable installer options available for selection by the user, including an option **344** labeled “Sensor Averaging.” Selection of the “Sensor Averaging” option **344** may cause the HVAC controller **18** to display a sequence of one or more screens which may allow a user to select which sensors participate in sensor averaging for operation and control of the HVAC system **4**. The sensors that may be available for sensor averaging may include, but are not limited to, any external wired or wireless sensor and the HVAC controller’s own internal sensor(s). The averaged sensor value may be used for temperature control, humidification control, dehumidification control, and/or any other suitable control.

FIGS. **16A-18** show several illustrative screens for selecting one or more sensors to participate in sensor averaging for operation and control of the HVAC system **4**. The sensor average may be calculated by dividing the sum of the individual sensor values by the number of selected sensors. In some cases, weights may be used to weight the sensor values. For example, the sensor value sensed by the sensor in the HVAC controller **18** may be weighted higher than a sensor value sensed by a remotely located sensor.

FIG. **16A** shows an illustrative screen **350** for selecting which sensor(s) are to be used for temperature control of the HVAC system **4**, and FIG. **16B** shows an illustrative screen **600** for assigning a weight to each of the selected sensor(s) if using a weighted sensor average for temperature control. Similarly, FIG. **17A** shows an illustrative screen **380** for selecting which sensor(s) are to be used for humidification control, and FIG. **17B** shows an illustrative screen **700** for assigning a weight to each of the selected sensor(s) if using a weighted sensor average for humidification control. FIG. **18** shows an illustrative screen **420** for selecting which sensor(s) are to be used for dehumidification control of the HVAC system. In some cases, all of the available sensors may be selected by default for temperature control, humidification control, and/or dehumidification control of the HVAC system **4**, as applicable. In other cases, only the internal sensor(s) of the HVAC controller **18** may be selected by default for temperature control, humidification control, and/or dehumidification control of the HVAC system **4**, as applicable. When more than one sensor is selected for any one of temperature control, humidification control, or dehumidification, the HVAC controller **18** may be configured to average the values sensed by the selected sensors and to use

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the average to control the desired parameter (e.g. temperature, humidification, or dehumidification).

Sensor selection screen **350**, as shown in FIG. **16A**, may include a user prompt **354** that prompts the user to select which sensor(s) are to be used for temperature control. Screen **350** may also include a list **358** of the sensors **360** available for selection. In the example shown, each of the available sensors **360** may be identified by their name and/or their location. In some cases, only the location is used to identify each of the available sensors **360**. The sensor name and/or location of each of the available sensors **360** may be assigned during connection of the sensors to the HVAC system **4** as described above with reference to FIGS. **5-10**. Additionally, in some cases, only those sensors that have been previously identified as having a temperature control function are included in the list **358**. For example, if a particular sensor has not been identified as having a temperature control function; it may not be included in the list **358**. Similarly, if the sensor has been previously identified as “View Only” or “Read Only”, it may not be included in the list **358** of available sensors. Each of the available sensors **360** included in list **358** may be individually selectable for use in sensor averaging, such that selection of one sensor does not affect selection of another sensor. Screen **350** may include a scroll bar **366** and/or first and second arrow keys **368a** and **368b** for navigating through the list **358** of sensors available for selection **360**. In some cases, selection indicator boxes **362** may be provided adjacent to each of the sensors **360** available for selection included in the list **358**. The selection indicator boxes **362** may include a check mark, an “X”, a dot, or be filled in to indicate selection. In the example shown, the user may deselect a previous selection by simply touching the selection indicator box **362**. In some cases, all of the sensors will be selected by default in which case, a user may need to deselect those sensors that they do not wish to contribute to the temperature control.

Sensor selection screen **350** may also include a “BACK” button **372** that, when selected, may cause HVAC controller **18** to display the previous screen. Additionally, sensor selection screen **350** may include a button **374** labeled “HELP” that, when selected, may cause HVAC controller **18** to display additional information about the current screen that may be useful to a user. Selection of button **376** labeled “DONE” may cause the HVAC controller **18** to accept the sensor selection(s), and to display a home screen such as home screen **300** of FIG. **13**. Selection of button **378** labeled “NEXT” may cause the HVAC controller **18** to display a sensor averaging screen **600**, as shown in FIG. **16B**, for assigning a weight to each sensor used to produce a weighted sensor average, if applicable.

Sensor averaging screen **600**, as shown in FIG. **16B**, may include a user prompt **604** that prompts the user to assign a weight to each of the sensor(s) previously selected for use in temperature control. Screen **600** may display a list **608** of those sensor(s) **360** previously selected for use in temperature control through sensor selection screen **350** as shown in FIG. **16A**. In the example shown, each of the selected sensors **360** may be identified by their name and/or their location. In some cases, only the location is used to identify each of the selected sensors **360**. A text entry box **612** for assigning a weight to a selected sensor **360** may be displayed adjacent to each of the selected sensors **360** displayed in the **608**. Screen **600** may include first and second arrow keys **616a** and **616b** for navigating through each of the text entry boxes **612** associated with each of the selected sensors **360**. Additionally, screen **600** may include a keyboard **620** that may be used by the user to enter the weight assigned to each

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of the selected sensors **360**. In some cases, the keyboard **620** may be a virtual keyboard. In other cases, the keyboard **620** may be a physical keyboard including hard buttons. In some cases, each of the sensors **360** displayed in list **608** will be assigned an equal weight by default.

Sensor selection screen **600** may also include a “BACK” button **624** that, when selected, may cause HVAC controller **18** to display the previous screen. Additionally, sensor selection screen **600** may include a button **628** labeled “HELP” that, when selected, may cause HVAC controller **18** to display additional information about the current screen that may be useful to a user. Selection of button **632** labeled “DONE” may cause the HVAC controller **18** to accept the assigned weights, and to display a home screen such as home screen **300** of FIG. **13**. Selection of button **636** labeled “NEXT” may cause the HVAC controller **18** to display another sensor selection screen **380**, as shown in FIG. **17A**, for selecting which sensors will be used for humidification control, as applicable.

Sensor selection screen **380**, as shown in FIG. **17A**, may include a user prompt **384** that prompts the user to select which sensor(s) are to be used for humidification control. Screen **380** may also include a list **388** of the sensors **390** available for selection. Each of the available sensors **390** may be identified by their name and/or their location. In some cases, only the location is used to identify each of the available sensors. The sensor name and/or location of each of the available sensors may be assigned during connection of the sensors to the HVAC system **4**, as was described above with reference to FIGS. **5-10**. In some cases, only those sensors **390** that have been previously identified as having a humidification control function are included in the list **388**. For example, if a particular sensor has not been identified as having a humidification control function; it may not be included in the list **388**. Each of the available sensors **390** included in list **388** may be individually selectable for use in sensor averaging such that selection of one sensor does not affect selection of another sensor. Screen **380** may include a scroll bar **396** and/or first and second arrow keys **398a** and **398b** for navigating through the list **388** of sensors available for selection **390**. In some cases, selection indicator boxes **402** may be provided adjacent to each of the sensors **390** available for selection included in the list **388**. The selection indicator boxes **402** may include a check mark, an “X”, a dot, or be filled in to indicate selection. In the example shown, the user may deselect a previous selection by simply touching the selection indicator box **402**. In some cases, all of the sensors will be selected by default in which case, a user may need to deselect those sensors that they do not wish to contribute to the temperature control.

Sensor selection screen **380** may also include a “BACK” button **404** that, when selected, may cause HVAC controller **18** to display the previous screen. Additionally, sensor selection screen **380** may include a button **408** labeled “HELP” that, when selected, may cause HVAC controller **18** to display additional information about the current screen that may be helpful to a user. Selection of button **412** labeled “DONE” may cause the HVAC controller **18** to accept the sensor selections and to display a home screen such as home screen **300** of FIG. **13**. Selection of button **416** labeled “NEXT” may cause the HVAC controller **18** to display a sensor averaging screen **700**, as shown in FIG. **17B**, for assigning a weight to each of the selected sensors for a weighted sensor average, if applicable.

Sensor averaging screen **700**, as shown in FIG. **17B**, may include a user prompt **704** that prompts the user to assign a weight to each of the sensor(s) previously selected for use in

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humidity control. Screen 700 may display a list 708 of those sensor(s) 390 previously selected for use in humidity control through sensor selection screen 380 as shown in FIG. 17A. In the example shown, each of the selected sensors 390 may be identified by their name and/or their location. In some cases, only the location is used to identify each of the selected sensors 390. A text entry box 712 for assigning a weight to a selected sensor 390 may be displayed adjacent to each of the selected sensors 390 displayed in the 708. Screen 700 may include first and second arrow keys 716a and 716b for navigating through each of the text entry boxes 712 associated with each of the selected sensors 390. Additionally, screen 700 may include a keyboard 720 that may be used by the user to enter the weight assigned to each of the selected sensors 390. In some cases, the keyboard 720 may be a virtual keyboard. In other cases, the keyboard 720 may be a physical keyboard including hard buttons. In some cases, each of the sensors 390 displayed in list 708 will be assigned an equal weight by default.

Sensor selection screen 700 may also include a “BACK” button 724 that, when selected, may cause HVAC controller 18 to display the previous screen. Additionally, sensor selection screen 700 may include a button 728 labeled “HELP” that, when selected, may cause HVAC controller 18 to display additional information about the current screen that may be useful to a user. Selection of button 732 labeled “DONE” may cause the HVAC controller 18 to accept the assigned weights, and to display a home screen such as home screen 300 of FIG. 13. Selection of button 737 labeled “NEXT” may cause the HVAC controller 18 to display another sensor selection screen 420, as shown in FIG. 18, for selecting which sensors will be used for dehumidification control.

Sensor selection screen 420, as shown in FIG. 18, may include a user prompt 424 that prompts the user to select which sensor(s) are to be used for dehumidification control. Sensor selection screen 420 may also include a list 428 of the sensors 430 available for selection. Each of the available sensors 430 may be identified by their name and/or their location. In some cases, only the location is used to identify each of the available sensors 430. The sensor name and/or location of each of the available sensors 430 may be assigned during connection of the sensors to the HVAC system 4, as was described above with reference to FIGS. 5-10. Additionally, in some cases, only those sensors that have been previously identified as having a dehumidification control function may be included in the list 428. For example, if a particular sensor has not been identified as having a dehumidification control function; it may not be included in the list 358. Similarly, if the sensor has been previously identified as “View Only” or “Read Only”, it may not be included in the list 428 of available sensors for dehumidification control. Each of the available sensors 430 included in list 428 may be individually selectable for use in sensor averaging such that selection of one sensor does not affect selection of another sensor. Screen 420 may include a scroll bar 436 and/or first and second arrow keys 438aa and 438b for navigating through the list 428 of sensors available for selection 430. In some cases, selection indicator boxes 442 may be provided adjacent to each of the sensors 430 available for selection included in the list 428. The selection indicator boxes 442 may include a check mark, an “X”, a dot, or be filled in to indicate selection. The user may deselect a previous selection by simply touching the selection indicator box 442. In some cases, none of the available sensors 430 may be selected by default in which case, a user

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may need to select those sensors which the HVAC controller 18 may user for dehumidification control.

Sensor selection screen 420 may also include a “BACK” button 446 that, when selected, may cause HVAC controller 18 to display the previous screen. Additionally, sensor selection screen 420 may also include a button 448 labeled “HELP” that, when selected, may cause HVAC controller 18 to display additional information about the current screen that may be helpful to a user. Selection of button 452 labeled “DONE” may cause the HVAC controller 18 to accept the sensor selections and to display a home screen such as home screen 300 of FIG. 13. It will be understood that if multiple sensors are selected for use in dehumidification control, then HVAC controller 18 may display a sensor averaging screen for assigning a weight to each of the selected sensors as discussed above in reference to FIGS. 16B and 17B.

When the HVAC system 4 is in operation, a user may view the average sensor readings for temperature, humidification, and/or dehumidification control by, for example, selecting the menu option 328 labeled “View Sensors” provided on menu screen 320, as shown in FIG. 14. Selection of the menu option 328 labeled “View Sensors” may cause the HVAC controller 18 to display a sensor data summary screen 460, as shown in the example provided by FIG. 19, which may provide a table 464 listing the individual temperature and/or humidity readings for each of the identified sensors. Sensor data summary screen 460 may include a “BACK” button 468 that, when selected may cause the HVAC controller 18 to display the previous screen. Sensor data summary screen 460 may also include a “HELP” button 470 that, when selected, may cause the HVAC controller 18 to display additional information about the current screen 460 that may be useful to a user. Additionally, sensor data summary screen 460 may include a “DONE” button 472, that when selected, may cause the HVAC controller 18 to display menu screen 320 of FIG. 14 or, in some cases, a home screen such as, for example, home screen 300 of FIG. 13.

When sensors are averaged for temperature control, humidification control, and/or dehumidification control, a “View Averages” option 476 may also be provided on the sensor data summary screen 460. The “View Averages” option 476, when selected, may cause the HVAC controller 18 to display a sensor averages screen 480a or 480b as shown in FIGS. 20A and 20B. FIG. 20A shows a sensor averages screen 480a in which humidification and dehumidification are combined and presented as a single humidity reading. FIG. 20B shows a sensor averages screen 480b in which values related to humidification and dehumidification are separately displayed. As shown in FIGS. 20A and 20B, the sensor averages screens 480a, 480b may include a first region 484 in which the average temperature and the average humidity (humidification and/or dehumidification, as applicable) are provided. Sensor averages screens 480a, 480b may also include a second region 488 that may list the sensors used for temperature control, and that were used to calculate the reported temperature average. Sensor averages screens 480a, 480b may also include a third region 492, which may list the sensors used for humidification control, and which were used to calculate the reported average humidity. Sensor averages screen 480b may also include a fourth region 496, which may list the sensors used for dehumidification control, and which were used to calculate the reported average humidity related to dehumidification. Sensor averages screens 480a, 480b may also provide a list 498 of those sensors that were identified as “View Only” or

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“Read Only,” and which were not used for temperature control, humidification control, and/or dehumidification control.

In some cases, the amount of data to be presented may be larger than can be accommodated in a single screen. As such, sensor averages screens **480a**, **480b** may include a scroll bar **502** including first and second arrow keys **504a**, **504** for navigating through the data on the sensor averages screens **480**, **480b**. Additionally, sensor averages screens **480a**, **480** may include a “BACK” button **506** that, when selected, may cause the HVAC controller **18** to display a previous screen. Sensor averages screens **480a**, **480b** may also include a “HELP” button **510** that, when selected, may cause the HVAC controller **18** to display additional information about the current screens that may be useful to a user. The “DONE” button **514**, when selected, may cause the HVAC controller **18** display a previous screen such as, for example, sensor data screen **460** of FIG. **19** or menu screen **320** of FIG. **14** or, in some cases, a home screen such as home screen **300** of FIG. **13**.

Having thus described several illustrative embodiments of the present disclosure, those of skill in the art will readily appreciate that yet other embodiments may be made and used within the scope of the claims hereto attached. Numerous advantages of the disclosure covered by this document have been set forth in the foregoing description. It will be understood, however, that this disclosure is, in many respect, only illustrative. Changes may be made in details, particularly in matters of shape, size, and arrangement of parts without exceeding the scope of the disclosure. The disclosure’s scope is, of course, defined in the language in which the appended claims are expressed.

What is claimed is:

1. A thermostat configured to control one or more components of an HVAC system of a building, the thermostat comprising:

a user interface including a display;

a memory;

a temperature sensor;

an I/O block for sending and/or receiving signals to and/or from the one or more components of the HVAC system including one or more wireless sensors; and

a controller coupled the user interface, the memory, the temperature sensor and the I/O block, the controller is configured to enroll one or more wireless sensors, and to solicit a name from a user for each of at least one of the one or more enrolled wireless sensors via the user interface of the thermostat, wherein the controller is configured to store the accepted name(s) in the memory of the thermostat and to subsequently display the accepted name(s) on the user interface of the thermostat when referring to the corresponding enrolled wireless sensor(s).

2. The thermostat of claim **1**, wherein the controller is configured to display a sequence of two or more screens on the display, wherein each of the two or more screens solicit information about at least one of the one or more enrolled wireless sensors.

3. The thermostat of claim **2**, wherein at least one of the two or more screens solicit an installed location of at least one of the one or more enrolled wireless sensors.

4. The thermostat of claim **2**, wherein at least one of the two or more screens solicit a function of at least one of the one or more enrolled wireless sensors.

5. The thermostat of claim **2**, wherein at least one of the two or more screens solicit which enrolled wireless sensors

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will participate in control of one or more components of the HVAC system, and which enrolled wireless sensors are for viewing only.

6. The thermostat of claim **2**, wherein at least one of the two or more screens solicit an installed location of at least one of the one or more enrolled wireless sensors, and at least one of the two or more screens solicit a function of at least one of the one or more enrolled wireless sensors.

7. The thermostat of claim **6**, wherein at least one of the two or more screens solicit which wireless sensors will participate in control of one or more components of the HVAC system, and which wireless sensors are for viewing only.

8. The thermostat of claim **1**, wherein one or more of the enrolled wireless sensors include a connect button, wherein when the connect button is activated by a user; the corresponding enrolled wireless sensor is identified on the display of the user interface of the thermostat.

9. The thermostat of claim **1**, wherein the controller is configured to display a list that includes at least two enrolled wireless sensors on the display of the user interface, each of the at least two enrolled wireless sensors being individually selectable by a user for sensor averaging.

10. The thermostat of claim **1**, wherein the controller is configured to receive a signal indicative of a low battery condition from one or more of the enrolled wireless sensors, and in response, to display an alert on the display of the thermostat identifying the corresponding enrolled wireless sensor.

11. The thermostat of claim **1**, wherein at least some of the enrolled wireless sensors are configured to detect a first low battery condition of the enrolled wireless sensor, and in response, to send the signal indicative of the first low battery condition to the thermostat, and after further battery depletion, the enrolled wireless sensor is configured to detect a second low battery condition, and in response, to activate an indicator on the enrolled wireless sensor itself indicative of the second low battery condition.

12. The thermostat of claim **1**, wherein the enrolled wireless sensors comprise one or more of a temperature sensor, a humidity sensor, and a gas sensor.

13. A thermostat configured to control one or more HVAC components of an HVAC system of a building, the thermostat comprising:

a user interface including a display;

a memory;

a temperature sensor;

an I/O block for sending and/or receiving signals to and/or from the one or more components of the HVAC system including one or more wireless HVAC components; and

a controller coupled to the user interface, the memory, the temperature sensor and the I/O block, the controller is configured to enroll a first wireless HVAC component, and in response to the first wireless HVAC component being enrolled, to display one or more screens on the display of the user interface of the thermostat that prompt the user to enter via the user interface of the thermostat a name, a location, a device type and/or a function for the first enrolled wireless HVAC component;

the controller is further configured to subsequently enroll a second wireless HVAC component, and in response to the second wireless HVAC component being enrolled, to display one or more screen on the display of the user interface of the thermostat that prompt the user to enter via the user interface of the thermostat a name, a

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location, a device type and/or a function for the second enrolled wireless HVAC component.

14. The thermostat of claim 13, wherein the controller is configured to display one or more screens on the display of the user interface that prompt the user to enter a name and a location for each of a plurality of the enrolled wireless HVAC components.

15. The thermostat of claim 13, wherein the controller is configured to display one or more screens on the display of the user interface that prompt the user to enter a name, a location, and a function for each of a plurality of the enrolled wireless HVAC components.

16. The thermostat of claim 13, wherein the controller is configured to display a list of enrolled wireless HVAC components on the display of the user interface in response to a request entered by a user via the user interface.

17. The thermostat of claim 13, wherein the controller is configured to prompt a user via the user interface to select two or more enrolled wireless HVAC components from a list of enrolled wireless HVAC components for sensor averaging.

18. A method for setting up a thermostat with a number of wireless sensors, wherein the thermostat includes a user interface with a display, the method comprising:

pressing a button on a first wireless sensor of the number of wireless sensors to generate a wireless signal from the first wireless sensor;

receiving the wireless signal from the first wireless sensor at the thermostat;

in response to receiving the wireless signal from the first wireless sensor at the thermostat, displaying a screen

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on a display of the thermostat that prompts the user to enter via a user interface of the thermostat a name, a location and/or a function of the first wireless sensor; and

storing the name, the location and/or the function of the first wireless sensor in a memory of the thermostat.

19. The method of claim 18, further comprising: displaying a list of two or more wireless sensors on the display of the thermostat including the first wireless sensor and the second wireless sensor for selection by a user for sensor averaging, wherein the list of two or more wireless sensors includes one or more of the name, the location and/or the function entered by the user for each of the two or more wireless sensors.

20. The method of claim 18, further comprising: pressing a button on a second wireless sensor of the number of wireless sensors to generate a wireless signal from the second wireless sensor;

receiving the wireless signal from the second wireless sensor at the thermostat;

in response to receiving the wireless signal from the first wireless sensor at the thermostat, displaying a screen on a display of the thermostat that prompts the user to enter via a user interface of the thermostat a name, a location and/or a function of the second wireless sensor; and

storing the name, the location and/or the function of the second wireless sensor in the memory of the thermostat.

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